II. *An Account of ſome Experiments relating to the Production of Fire and Flame, together with an Exploſion; made by the mixture of two Liquors actually cold. By* Frederick Slare, *M. D. Cenſor and Fellow of the Colledge of Phyſicians: and of the* Royal Society.

I Gave an Account of ſeveral Experiments made by the mixture of various Liquors, ſome of them produced much Heat, others a great Ebullition with a cold Effect, others ſparks of Fire without Ebullition, and ſome few that did produce an actual Flame; but the difficulty to make the *Phoſphorus* (which was uſed in the greateſt of theſe flaming Experiments) is ſuch as has made that ſort of Experiment ſcarce Credible by ſome, and Practicable by few; in ſo much that I queſtion not but that it will be grateful to the Curious *Virtuoſo* of this Age, to ſee two clear Liquors both of them actually cold, without any intermediate or third Body, riſe up to a flame by kindling one another; beſides having made it eaſie for them to make or procure the Ingredients which perform this, not common Effect, it may yet be more acceptable.

Philoſoph. Tranſact. of the year 1683. Month of *Auguſt.*

The Experiment of Accenſion.

Take of any one of the Eſſential Oyls ſet down in the Catalogue, one part, of the Compound Spirit of Nitre two parts, (theſe may be Drams if you pleaſe) and they will with great Celerity and a great Noiſe produce a Flame, which laſts a very little while, but leaves an inſipid *Caput Mortuum*, as light and taſtleſs as a Cobweb.

But leſt we ſhould incur the Cenſure of thoſe that may attempt the making this Experiment, for want of ſetting down ſuch particular Directions as are neceſſary to make this nice and curious Experiment, ſucceſsful, I intend to be very plain and diſtinct both in the way and Method of preparing the ſeveral Spirits and Oyls that are uſed about it, and alſo as to the manner of mixing them.

1. This Experiment ſhould be made under a Chimney, or any convenient Draught, that ſo the offenſive ſteams may evaporate.

2. A Gally-Pot, ſpacious enough to hold four or five Ounces of Water, may be a convenient Veſſel for this Experiment, if you only uſe the forementioned Proportion; but if you pleaſe to uſe larger quantities, then you muſt enlarge the Veſſel.

3. You muſt put the Oyl into the Gally-Pot firſt, and then pour the Spirit on the Oyl, becauſe the Spirit being heavier, does the better paſs through the Oyl, and make a more Expeditious Mixture. This muſt not be dropt in gradually, but conveyed in altogether.

4. Hold not your Head too near the Gally-Pot, leſt the ſudden Exploſion of the Matter ſhould ſtrike up ſome of it into your Face.

5. The Compound Spirit will loſe much of its Vertue if kept too long.

The way of Preparing the Spirits for this Experiment.

Take of Salt-Peter and Oyl of Vitriol equal parts, and Diſtil theſe out of a Retort in a good Sand Furnace, ſo that the Sand continue red-hot for ſome hours, for the Fire cannot be too great; the Fumes will riſe of a very deep red colour, and will ſettle in the Receiver, in the form of a Liquor, which muſt be carefully preſerved from the Air; this being the Spirit with which all our Experiments were made, which are referred to in the Catalogue.

To make the Common Spirit of Nitre, you need only to mix five or ſix times as much Clay as you take of Nitre, and Diſtill them in a Retort, and you may obtain a ſtrong Spirit of Nitre this way, eſpecially if you dephlegm it,and rectifie it to the beſt Advantage.

With this we have made an Experiment of Accenſion ſucceed ſometimes, but with great uncertainty; but the firſt, which I call the Compound Spirit of Nitre, is only to be relyed on.

That Chymiſtry has been very pregnant in producing many good *Phænomena* very Serviceable to the better Explication of Natural Philoſophy, and alſo very uſeful in Preparing Medicines for Curing Diſeaſes, the Learned Men of this Age do generally allow; and that *Glauber*, though a very Chymiſt or Laborant, and nothing at all of a clear Philoſopher, has yet led on the beſt of Chymiſts, not only to make good Furnaces, but alſo other good Medicinal Preparations, I found the Matter of Fact the truer the more I peruſed him. He hints at the way of making this Compound Spirit of Nitre, and alſo the Compound Spirit of Salt, by Diſtilling them with Oyl of Vitriol, but after ſuch an Invidious and Ænigmatical manner, that he obſcures it all he can, and leads the Operator forward and backward on purpoſe to perplex him; which indeed has had this good Effect, That he has put us upon differing ways of Preparing this Spirit,and making it much more Noble than the Author did himſelf, who yet ſo over-valued it,as to think he had found the greateſt *Arcanum* in the World, and ſet this on the top of his Preparations, ſtiled, *Miraculum Mundi*, and the other Salt muſt be called *Sal Mirabile*; to which he attributes Twenty Six ſuch extraordinary Properties, as the Experimentors of this Age can no wiſe find, neither in his Salt, nor in the whole Creation. But had he been ſo Fortunate to have found out this Illuſtrious Experiment, it would have blown up his Fancy to ſome great Rapture.

Having got over this Digreſſion, I come now to attempt ſomething as to the Ætiology of this Experiment, and will firſt endeavour to find out what ſhare our Compound Spirit of Nitre has in making this *Phænomenon*, and then will ſubjoyn my thoughts about the Oyls.

This Compound Spirit ſeems to be the Active Principle that ſtirs up the Oily, or more Paſſive Particles to take fire, which will more eaſily be agreed to, if we conſider that our Compound Spirit of Nitre does not only conſiſt of all thoſe igneous Particles to be found in Common Spirit of Nitre, but that it has alſo all thoſe igneous Particles which Oyl of Vitriol contains in it, crouded into our Spirit of Nitre made this way.

For further Illuſtration, let us conſider what Oyl of Vitriol is. It is a Creature of the Fire: That the Sulphur, which is plentifully in Vitriol, or in Copperas, is accended, and afterwards diſtilled over in the form of a Liquor, which is a liquid ſort of Fire, as having many Properties of it. If you put it to Water it will make it boyling hot; it burns not only Linnen and Woollen, but Wood to a Coal, and ſcarce ſpares any thing.

Nitre, the other Ingredient of our Spirit, is very ſuſceptible of Flame, which does alſo incorporate many igneous and corroſive Particles after it has ſo many hours lain ignited in the Fire, comes over, by Diſtillation, very highly impregnated with the ſame fiery Particles; which is obvious to any one that has uſed to make Experiments with it. For Nitre it ſelf has no diſſolving or heating Quality, but is a great cooler, and ſcarce can be reckoned amongſt Acids; but after it comes out of the Fire in the form of a Spirit, it tears in pieces almoſt all Metals, and brings them to a ſort of Fuſion, as actual

Fire does; it diſſolves Animals, and Vegetables, and Minerals; and has many Effects of Fire. Therefore from an Union of theſe two very fiery Spirits reſults a much greater quantity of igneous Matter.

That Fire is very apt to incorporate with Fluids, and even ſuch as have had but a ſmall Communication with it, an Experiment which I formerly exhibited at a Meeting of the *Royal Society*, makes probable.

We took of Spirit of Wine that was highly rectified a Wine-Glaſs half full, and placed a tender Weather-Glaſs or Thermometer in the Glaſs, and then put a Spoonful of Water to it, this immediately warmed the Liquor, and made the Weather-Glaſs aſcend two Inches at leaſt: The Liquor in the Weather-Glaſs ſubſided as the other Mixture grew cold. I made it more ſenſible to the Touch by filling the Palm of the then Preſident's Hand with Spirit of Wine, and putting a ſmall quantity of cold Water into the ſame Hand, which made it ſenſibly warm his Hand, as well as others that made the Tryal. But from this Spirit, which is too Volatile to endure much Communication with the Fire, you may expect only a mild tepid heat; I am apt to believe, that there is ſcarce any thing which lies long in the Fire, but is apt to retain ſome igneous Particles; which does appear to be ſo in all fixed Salts, in Quick-Lime, and more particularly in Iron. If you take a Bar of Iron, though of a Hundred Years old, and file off about a Pound of it, and then you do mix and imbibe theſe Filings with a due proportion of Water, enough to make the whole juſt moiſt; the Fire, which all this while lay concealed in the Iron, being more diſpoſed to enter into the fluid, does by theſe means warm the whole Maſs. The Iron gained this heating Quality by Fuſion in thoſe fierce Fires which firſt ſeparated the Metal from the Ore. For it is not in the Nature of the Ore before Fuſion to emit any heat, as I have found by mixing Water with it.

There

There are a great many other Inſtances which make it very plain that Fire will add both to the bulk and weight of Bodies; but theſe affect Solid Bodies more manifeſtly. The Effect it ſelf produced by our Fluid does neceſſarily prove the inherent fiery Particles to have cauſed the Accenſion.

And this leads us to the other part of our Matter, which in conjunction with the Compound Spirit cauſes this Accenſion and Exploſion.

But here it will not be amiſs to premiſe a diſtinction of Oyls into Vegetable, Animal, and Mineral; having made ſome Experiments with all theſe, but moſt of all with Vegetable; for which reaſon we ſubdivide again the Vegetable into thoſe made by Expreſſion, and thoſe made by Diſtillation: And of thoſe made by Diſtillation we diſtinguiſh thoſe that are made out of the Seeds from thoſe that are made out of the Trunks, or Cortex, or Roots, or any other part of the Vegetable. We further obſerve a difference betwixt thoſe Seeds that have only a fragrant ſmell and a pungent taſt alone, from thoſe that have both Odorous Emanations and a brisk Taſt together, and thoſe that are inſipid, and have no ſmart Taſt.

In the firſt place we muſt ſet aſide thoſe Oyls made by Expreſſion. For having tryed Oyls of Line-ſeeds, of Nuts, of Olives, of Almonds, &c. we found theſe would not make Exploſion or Ebullition, or ſo much as any Fermentation with our Fiery Meteor. Nor could I without much ſtirring bring them to incorporate: And when they did incorporate the heat was but juſt ſenſible, and the reaſon may be becauſe this ſort of Oyl, though allowed to be a true *Pabulum flammæ*, for it may be made to flame alway, yet it is not a true Oyl, although it muſt be allowed to have one Property of Oyl, that it mixes not with Water; yet it doth not ſtand the Teſt of the Fire, for if you Diſtil it, you may part from it

Water, and Earth, and Soot, and a true Eſſential Oyl, which afterwards will bear repeated Diſtillations without any further diſſolution.

Having ſet by theſe Vegetable, but not Eſſential Oyls, we will briefly examine the Mineral Oyls, of which there are ſome, as Oyl of Vitriol, Oyl of Sulphur *per Campanam*, that have not any Property of Oyls, but are rather Acids, and Corroding *Menſtruums*. There are others that have the true Property of Eſſential Oyls, as *Oleum Petreoli*, and *Barbadoes* Tar highly rectified, which do not produce any Remarkable Heat, much leſs make an Ebullition or Exploſion: Nor does that active Oyl of Amber do any thing more.

The ſtillatitious Oyl of Bees-wax had much the ſame Effect when it was incorporated with our Compound fiery Spirit: And this inclines me to believe that the Wax it ſelf may be a Compound more belonging to a Mineral than Vegetable Nature.

And now we will examine thoſe Eſſential Oyls, which do produce great Ebullition, Exploſion, and Flame, with the Compound Spirit. Of theſe we have two ſorts, Vegetable and Animal.

The true Vegetable Eſſential Oyls do all of them make violent Ebullition and Exploſion, and ſeveral do actually take fire and Flame, as the Catalogue of Experiments do ſpecifie.

If it be enquired into, what ſhare the Oyl has in producing this Fire, whether only it be a *Pabulum*, or Fewel, for the Spirit to actuate, and ſo be meerly Paſſive? Or whether it contributes any Particles that do help to excite this Flame?

In order to reſolving this Doubt, we conſider, That theſe Eſſential Oyls are produced from Seeds that have very active or warm Parts or Spirits, ſuch as will eaſily ferment and heat, and have a warming Influence upon our Tongues, and do give heat to the Stomach and

Blood

Blood of Animals. That the Seed is the Syſtem or Concentration of the whole Plant, and has Spirit or Ferment enough lodged in it to aſſimilate all that inſipid watry Element (which contributes Matter to its growth) into its own Nature; from hence the great quantities of Eſſential Oyls are produced. It's true, out of the Trunks, and Roots, and Parts of Trees we have Eſſential Oyls extracted, but with a vaſt diſparity, there being only a very ſmall quantity (in proportion to what is in the Seeds) floating up and down the other parts of the Vegetable.

But I am not only to take notice of the Potential warmth of the Vegetable, there being in my Opinion another Ingredient fit to be obſerved, which our Eſſential Oyls may be proved to contain, and that is a Volatile Salt, which gives much of that pungency to the Taſt. If we conſider the Conſtituent Parts of theſe Active Vegetables, they much abound with Salts, which by a moderate Fire are made Volatile, and by a violent Fire are fixt. This ſeems to me more than probable by what I have found in a quantity of Oyl of Cinamon, having had it in my own keeping for Twenty Years; for about Ten or Twelve Years it continued the ſame, but within theſe ſix later Years it has Annually let fall ſome Salt, inſomuch that it is now one half of it turned to Salt, and this without any addition or any Art uſed to reduce it to this form.

There is alſo ſeparated in Diſtillation of great quantities of Vegetables, as of Thyme, Organ, Penny-royal, &c. a Volatile Salt of a peculiar Nature (which our Excellent Chymiſt, Mr. *Molt*, firſt ſhewed me, and keeps quantities of it by him) this is very clear, or Cryſtalline, in its Specifick Gravity a ſmall matter heavier than Water, and ſeems to be Salt and Oyl coagulated into a Body: It will not diſſolve in Water, but eaſily evaporates when heated. I now conſider theſe Salts as Alkalies, which all true Volatile Salts are, they do preſently Ferment and make great Colliſion with Acids, and therefore am much inclined to make this Inference, That our Oyl is not a bare *Pabulum ignis*, or an unactive Principle, but does upon a double account as well upon the ſcore of the incaleſcent Oyl as of the inherent Salt conſpire with the Compound Spirit to make this great Heat, Exploſion, and Accenſion.

In the Catalogue of Experiments,

We may further obſerve, That of the light Eſſential Oyls drawn from Seeds of Vegetables, all of them do make a great Ebullition with an Exploſion, but that few of them do actually take Fire: And that all of thoſe that are drawn from Trunks or other Parts of our Vegetables, do certainly take Fire and Flame. Wherefore having obſerved that theſe that do not take Fire or Flame, did yet make as great an Exploſion and Ebullition, and probably as great a Heat as thoſe that did, I was apt to impute it to the Lightneſs and too great Subtilty and Volatility of thoſe Eſſential Oyls, whoſe very active Particles did too ſoon exhale or fly away. And this Conjecture is ſomething juſtified by the Addition of a more Ramous Body, (which was Balſam of Sulphur made with Oyl of Turpentine) to our moſt Volatile or Subtile Oyls, which then produced a Flame, whoſe Particles being more Craſs or Ramous, will detain the more Volatile Oyl from too ſoon an Exploſion, and give more time to the fiery Spirit to penetrate, and mix it ſelf with thoſe Combuſtible Materials. And this may be one Reaſon why the Ponderous Oyls diſtilled from the Roots or Ligneous parts of a Plant do all take Fire, namely, becauſe the parts of this ſort of Oyl lying cloſer together, do not ſo ſoon diſſipate after the Spirit is caſt upon it. And then to the Specifick Gravity the difference is alſo very conſiderable, which any one may find by this familiar way: If you fill a Glaſs with one Ounce of the Eſſential Oyl of the Seeds, you will require Nine Drams of the Ponderous Oyl of the Vegetable to fill up the ſame ſpace.

This is alſo very obvious to any Spectator, that moſt of theſe Oyls thus diſtilled are more Ponderous than common Water, by their ſinking to the bottom; whereas all our Eſſential Oyls drawn from the ſeedy parts, do ſwim on Water, and ſome are lighter than the beſt rectified Spirit of Wine, but moſt are lighter than Brandy, which has made our Chymiſts call them Ætherial Oyls.

In the Catalogue of Experiments you may find which are the Ponderous Oyls, that do conſtantly take fire. Moreover the Ponderous Oyls have yet one Advantage above the lighter Volatile Oyls, they having been expoſed to a longer and ſtronger degree of Fire than the others, and ſo do incorporate more Igneous Particles with it ſelf, which being put into motion, may contribute ſomething to cauſe this Accenſion.

The Oyls diſtilled from Animal Bodies do all of them take Fire and Flame, but with this difference, they do not make ſo great an Exploſion as the Vegetable do, but do more certainly take fire, and will continue their flame longer, but not ſo fierce as the other. If we rightly Examine the Conſtitution or Texture of this Oyl, we have ſeveral Properties adapted to the Production of this Effect. You have a much greater degree of Fire required in the Diſtillation of this Oyl than is neceſſary for that of the Vegetable. You have alſo a great quantity of Volatile Salts (which are true *Alkalies*) that do paſs over with your Oyl: And you have a Ponderous Oyl, that ſinks in Water; which being conſidered and weighed together, do make it equitable

table to expect a more conſtant Accenſion from the Animal Oyls than from any other.

Oleum Succini is juſtly put in the Catalogue of Minerals, and is produced by a ſtrong degree of Fire (as is above mentioned) does yet not make any Motion, and ſcarce any Incaleſcence with this Oyl, notwithſtanding its abounding with Volatile Salts: The reaſon is, becauſe theſe Salts are not properly Volatile, as *Alkalies* are, but do belong to the Family of Acids, and ſo can make no Ferment with this Compound Spirit, which is it ſelf highly Acid.

Having now made it plain and eaſie for any one to make two Liquors, actually cold, without any adventitious heat or fire, boyl up to a Flame, it will ſeem ſtrange that after ſo many Experiments made in the World by all ſorts of Chymiſts, and with all manner of Fermenting and Fiery Ingredients, none ſhould have diſcovered a certain way of producing this great and deſirable Effect. For though I will not queſtion the veracity of the great *Borichius*, who declares to the World, that he made his Oyl of Turpentine and Spirit of Nitre to take Fire and Flame; yet for my part, after ſo many unſucceſsful Experiments made with the greateſt Accuracy I could, I muſt ſtill own my incapacity to perform it: But if you add ſome drops of Balſam of Sulphur to that Oyl of Turpentine, the Effect will then very certainly ſucceed, and your Mixture advance to an actual Flame. However it may prove as to this laſt mentioned Mixture, the great variety of other Liquids that are made to kindle and produce flames, will now put the Matter of Fact out of Queſtion, which I am told has been by many Experimentors doubted of.

A Strange Experiment of Exploſion and Accenſion made in Vacuo.

I Shall venture here to add one ſurprizing Effect of this Fiery Mixture, which was done in the Preſence of ſeveral Spectators.

We took half a Dram of the Oyl of Carui-Seeds, and poured it into a little Gally-Pot, and put a Dram of our Compound Spirit of Nitre in a ſmall Vial into the ſame Gally-Pot, and placed over it a Glaſs that held Three Pints upon Monſieur *Papin*'s Exhauſting Engine, and having ſoon cleared it of the Air, we turned up the Vial in Order to ſee what Effect would enſue, in this ſort of *Vacuum*, upon this Mixture: But in the twinkling of an Eye the Receiver was blown up, and the Mixture in a flame, which ſtupendious *Phænomenon* ſurprized and frightned us all. Nor did I ever ſee or hear of the like by any Mixtures made in *Vacuo*, though I have my ſelf ſeen a Thouſand. For if we look into thoſe many and Admirable Experiments made by the Immortal Mr. *Boyle*, the removal of the Air did almoſt always extinguiſh Light, and Fire, and Flame.

The blowing up of the Glaſs does alſo make the Experiment the more aſtoniſhing, and puzzles one how to Account for ſo great a quantity of Air as was produced from theſe Liquors, which amounted only to a Dram and half; for here was required not only Air enough to fill up the capacity of the Veſſel, but alſo there was required ſo great a preſſure within as did exceed that great incumbent weight of the Air that preſſed upon this capacious Glaſs without, (whoſe Diameter was Six Inches, and the depth above Eight) for otherwiſe it would not have thrown it up into the Air.

If we review and conſider well the *Phænomena* of this Experiment, we may find the reſiſtance of ſome Hundred weight that was countervailed; and not only ſo, but with a much greater force exploded.

That it was not produced by any Expanſion of the Common Air, for that was ſeen to riſe out of the Liquors themſelves, and was drawn out of them in their ſeparate ſtate by the Exhauſting Engine, which ſuffers no Elaſtical Air to lye concealed in any Liquors.

That it was produced in an inſtant by the mutual Colliſion and Agitation of theſe Active and Self-Expanding Liquors.

That it was not abſolutely generated, *de Novo*, but that the Air was antecedently there, we may reaſonably believe, although in a very differing ſtate from what it is in, when in *Pleno*. For all that the Exhauſting Engine does is to deliver the Air from a ſtate of Compreſſion, by leaving it to ſtretch it ſelf like a Bladder, that has full liberty to ſwell up, and has no hard Body to ſtreighten or oppoſe its Expanſion: So that we have cauſe to conclude our Liquors to be furniſhed with this ſort of Air, which, being by the Accenſion of theſe two Liquors put to a new and violent motion, do expand themſelves, *de Novo*, and to that degree, as to anſwer ſo great an Effect as is above-mentioned.

The Circumſtances of which *Phænomenon* will allow me to call this Mixture a ſort of Liquid Gun powder, which brings me to make

A Compariſon with Gun powder and the Fiery Mixture.

Theſe *Phænomena* agree, in that both do heat, and burn, and flame; and alſo do conſiderably reſiſt and raiſe up Bodies that do oppoſe them: In both, the Air is much agitated and expanded. For in Gun-powder you have much Air coil'd up and included in Particles of Nitre, which the Brimſtone and Charcoal by their ſudden Accenſion do violently expand and ſwell to that degree, that like a ſtorm of Wind it bears very heavy and reſiſting Bodies before it, eſpecially when it it compreſſed or reſtrained within juſt Bounds.

The Experiment juſt above mentioned can only account for that Exploſion by charging it to ſome little concealed Air our Fiery Mixture expanded; in ſo much that I doubt not that if a way were invented (which ſeems to me not impracticable) to make it go off as Powder does out of a Gun, it would project a heavy Body a great way.

We further made an Experiment in *Pleno*, or after this manner:

We put a ſmall quantity of the Oyl in a Gally-Pot, and ſome of the Spirit in an open Glaſs, and fixed a Plate of Copper upon the Gally-Pot, ſo as to cover it pretty exactly, and then ſet a Weight upon the Plate, and pulling a ſtring, made the Spirit to mix with the Oyl, which did at that inſtant blow up the Cover, and throw off the Weight.

But though it doth in ſome reſpects agree with Gunpowder, yet in others you ſee a great diſparity: For Gun-powder will not be made to take Fire, or make any Exploſion in *Vacuo*, both which this Mixture performed with the ſame Celerity it did in the Air.

Gun-powder is a Compoſition of the moſt dry and Combuſtible Materials we can pack together; in our mixture of two Fluids, one of them is not eaſily made to burn by it ſelf, and the other will exſtinguiſh Common Fire.

Gun-powder requires actual fire to bring it to an Accenſion, whereas in this you have only two Waters or Liquors, both cold to the Touch, that do produce Fire and Flame by the bare joyning and mixing them together.

And

And now we will conclude this Experiment, only taking notice of the *Caput Mortuum*, (as Chymiſts call it) or of what remains after the Accenſion is over, which ſeems to be ſomething uncommon.

In caſe you have adjuſted the Proportion of Spirit to the Oyls exactly well, you will not fail to make the Mixture flame: And upon the extinction of the flame you will have a light and blackiſh Subſtance, which will indeed vary both as to the Bulk and Complexion, according to the difference of the Oyls. But in this they all agree, namely, to leave behind a ſpungy and exceeding light Matter, and perfectly inſipid. Sometimes it ſwells up into a great Protuberance, as big as a Man's fiſt above the Gally-Pot; and if you taſt it (which you may ſafely do) and macerate it in your Mouth, you will find it to be as taſtleſs as Paper, or even Paper when burnt to Aſhes. In ſo much that we may ſafely conclude that by this Powerful Mixture a third Solid Body reſults abſolutely differing from either of the two mentioned Liquors: And which makes it the more Remarkable, that both of theſe Fluids, which have ſo great an impreſſion upon the Organs of Smell, and a very great one on the Organs of Taſt, ſhould in an inſtant be deſtroyed, and terminate in a dry inſipid *Caput Mortuum*, which will not melt in the Air, nor be diſſolved by Water, nor other Corroſive *Menſtruums*, but remains as much a *Caput Mortuum*, as a piece of Paper, or a Rag burnt to Aſhes, if not much more.

Upon a review of the whole, this Experiment will poſſibly not only ſurprize and amuſe ſome, but pleaſe and delight others; and not only ſo, but perhaps afford ſome Inſtruction to a Philoſophical Genius. By this the Power of Motion, in order to the producing thoſe great Effects of Heat, Fire, Flame, and Light, may be conſidered; the Natures of Oyls ſomewhat examined and extinguiſhed, the Productions of new Bodies by the

Power of Mixture repreſented, and I hope in time ſome Mechanical uſe made of it, at leaſt its heartily wiſhed ſo.

Since this Paper was almoſt finiſhed, having diſcourſed with Mr. *Molt*, a moſt Ingenious Chymiſt, and deſervedly a Fellow of the *Royal Society* (to whom I muſt acknowledge an Obligation for the liberal uſe he allowed me of his great and Excellent Collection of Eſſential Oyls) about his Obſervations in thoſe Tryals he has made, and particularly about Oyl of Turpentine, whether he did ever make Oyl of Turpentine take fire, which he does affirm that he has performed it; but yet it proves ſo hard a matter to bring it to an Accenſion, that he is always doubtful of the ſucceſs.

I know that if a Candle be brought any thing near the ſmoak, raiſed by this Mixture, then the Oyl will certainly take fire from the flame of the Candle. Not but that I am glad of this or any Opportunity to do Juſtice to the Memory of the Famous *Borichius*, who has Printed an Experiment of this ſort in the *Acta Hafnienſia.*

Mr. *Molt* did alſo inform me, that Spirit of Wine would give a flaſh of Light with this Compound Spirit, but not burn; and he has obſerved the ſame Circumſtance in his Experiment (which I did formerly in the Year 1683.) That if you put your Spirit of Wine to the Nitre, you will have a great Effervefcence immediately enſue; but if you invert the order, and put the Spirit of Nitre on the Spirit of Wine, you will not have any Ebullition for ſome time: But this Circumſtance is quite contrary to all the other Experiments we have made about the Oyls.

See Tranſ. N°. 150. pag. 293.

That the Spirit of Wine does not take fire, ſeems to proceed from the ſame Impediment which hinders light Oyls from coming up to an Accenſion, becauſe they are ſo ſuddenly thrown off; and there ſeems to be a great

Analogy

Analogy betwixt Ætherial Oyls and the Spirit of Wine, both as to Specifick Gravity, and as to other Properties, Spirit of Wine ſeems to be a more thin and diluted Eſſential Oyl, that contains ſome Water and more Air in its Pores, they ſeem to own the ſame materal Cauſe; for if you Diſtil an Eſſential Oyl out of any Seed, you ſhall not then be able to produce any Spirit, and *Vice verſa*, if you Diſtil off the Spirit firſt, no Oyl will follow. There is alſo a great affinity in Texture, for the Spirit and Oyl do eaſily unite and mix together, eſpecially if the Spirit be highly rectified, and have leſs of Water or other heterogeneous Matter in it; as any one may find if he will take the pains to ſhake a true Eſſential Oyl with Spirit of Wine, a good proportion of the former will incorporate with the latter.

POST-SCRIPT.

THE *Pyrites* being the Mother of our Oyl of Vitriol, which is the principal Ingredient in our Active Fiery Meteor or Compound Spirit; I will here ſet down an Account I received of an honeſt unphiloſophical Friend of mine, who complained of his great Loſs, which he attributed as a Puniſhment of his Covetouſneſs. He was Maſter of a Copperas Work at *Whitſtable* in *Kent*, and engroſſed all the *Pyrites* or Copperas-ſtone to himſelf, in order to the breaking of a Neighbours Work, in ſo much that he had laid up two or three Hundred Tun in a heap, and built a Shed over it to keep off the Rain: But in the ſpace of ſix or ſeven Months it firſt ſmoaked, and then took fire, and burnt for a Week; it burnt down the Shed, ſome of it look'd like melted Metal, and other parts like red-hot Stones, but diſcharged ſo fætid, Sulphurous, or ſtinking Exhalations, that the People in the Neighbourhood were miſerably afflicted, and forced to uſe all their endeavours to extinguiſh it.

How far this Communication will ſerve the Hypotheſes of thoſe that derive Lightning, and Thunder, and Earthquakes from the Matter of the *Pyrites*, or will Account for the Riſe or Continuance of burning *Vulcans*, or even the Great Conflagration of the World, I leave to their Conſideration.